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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/055,420	01/23/2002	Xu Wu	60.1377/SDR-067	7263

36822 7590 12/15/2005

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EXAMINER
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STOCK JR, GORDON J

ART UNIT	PAPER NUMBER
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2877

DATE MAILED: 12/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/055,420

Applicant(s)

WU ET AL.

Examiner

Gordon J. Stock

Art Unit

2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-18 and 20-25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-10, 22 and 24 is/are allowed.
- 6) ☒ Claim(s) 11-18, 20, 21, 23 and 25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 July 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

1. The Amendment received on September 30, 2005 has been entered into the record.

#### *Claim Rejections - 35 USC § 112*

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. **Claims 14-16** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

As for **claim 14**, the phrase, “said first portion of said optical fiber of said optical probe includes a base adjacent said cone, said base tapering in diameter from a larger to a smaller diameter as said probe extends distally towards said cone” is indefinite, for it is unclear as to how the first portion may taper and therefore change in diameter and also have “substantially constant diameter” as stated in **claim 11**. **Claims 15-16** are rejected for being dependent upon a rejected base claim.

#### *Claim Rejections - 35 USC § 102*

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. **Claims 18 and 20** are rejected under 35 U.S.C. 102(b) as being anticipated by **Wickersheim et al. (4,626,110)**.

Art Unit: 2877

As for **claims 18 and 20**, Wickersheim in a technique for measuring temperature discloses the following: an optical probe (Fig. 2: 15) comprising an optical fiber (Fig. 2: 29, 31, 33) having a distal end comprising a hemisphere (Fig. 2: 25). In addition, he discloses fiber has a base adjacent said hemisphere, said base tapering in diameter from a larger to smaller diameter as said fiber extends distally towards said hemisphere (Fig. 3).

***Claim Rejections - 35 USC § 103***

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. **Claims 11-13** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Suzuki et al. (4,625,724)**.

As for **claims 11-12**, Suzuki discloses an optical probe, laser probe (Fig. 1:10) comprising a continuous optical fiber having a first portion of substantially constant diameter (Fig. 1: 14, 13) and a tip (Fig. 1: 12) formed as a substantially uniform cone having a conical face (Fig. 2: 12) said substantially uniform cone extending to said first portion (Fig. 2: 12 to 14). And the tip may be sharp to pierce membranes (Fig. 3: 18). As for a 45 +/- 2 degree face relative to the axis, he implies that this may be, for the apex angle may be smaller than about 96 to 30 degrees (col. 3, lines 25-30). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that the cone may have a face that is 45 +/- 2 degrees relative to the axis, for the apex angle may be from 96 degrees to 30 degrees.

As for **claim 13**, Suzuki discloses everything as above (see **claim 11**). In addition, he discloses a tip that is symmetrically rounded (Fig. 2: at apex angle); wherein, the tip appears to

Art Unit: 2877

be no more than twenty five percent of a width of said optical probe at a base adjacent said cone (Fig. 2: rounded tip at apex angle, theta, compared to diameter of 10)

8. **Claim 14** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Suzuki et al. (4,625,724)** in view of **MacDonald (5,044,723)**—previously cited.

As for **claim 14**, Suzuki discloses everything as above (see **claim 11**). In addition, he discloses a base adjacent said cone that comprises the cladding (Fig. 2: 12 and 14). He is silent concerning the optical fiber having a base adjacent formed through tapering; whereas, the diameter of the base adjacent spherical shape would decrease as it tapers to the distal spherical end. However, MacDonald in a tapered fibre sensor teaches using tapering to enhance focusing of propagating light; whereas, the taper conforms to the shape of the distal end (Fig. 8). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have said base tapering in diameter from a larger to smaller diameter as said probe extends distally towards said cone in order to focus the laser light propagating out of the laser probe.

9. **Claims 15-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Suzuki et al. (4,625,724)** in view of **MacDonald (5,044,723)**—previously cited further in view of **Friedman (5,371,826)**-previously cited.

As for **claims 15-16**, Suzuki in view of MacDonald discloses everything as above (see **claim 14**). He is silent concerning the taper being less than ten degrees or at most 5 degrees. However, Friedman in a optic light bundle conductor teaches having the taper no more than five degrees for generation of optimal convergent light with minimal light loss (col. 1, lines 50-55; col. 4, lines 3-15). Therefore, it would be obvious to one of ordinary skill in the art at the time

Art Unit: 2877

the invention was made to have a taper of at most five degrees to minimize light loss and optimize light convergence.

10. **Claim 17** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Suzuki et al. (4,625,724)** in view of **Wu et al. (6,023,340)**—cited by applicant.

As for **claim 17**, Suzuki discloses everything as above (see **claim 11**). He is silent concerning the diameter being from 200 to 400 microns. However, Wu in an optical probe teaches that 10 to 1000 microns or 100 to 300 microns work well for fiber diameters (col. 7, lines 50-55). Therefore, it would be obvious to one skilled in the art to have the fiber be 200 to 400 microns in diameter, for optical probes work well with fiber diameters between 10 and 1000 microns.

11. **Claim 21** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Wickersheim et al. (4,626,110)** further in view of **Friedman (5,371,826)**—previously cited.

As for **claim 21**, Wickersheim discloses everything as above (see **claim 20**). He is silent concerning the taper being less than ten degrees. However, Friedman in a optic light bundle conductor teaches having the taper no more than five degrees for generation of optimal convergent light with minimal light loss (col. 1, lines 50-55; col. 4, lines 3-15). Therefore, it would be obvious to one skilled in the art to have the system have a taper of be less than ten degrees for a taper at most at five degrees minimizes light loss and optimizes light convergence.

12. **Claim 23** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Sahagen (5,526,112)**—previously cited in view of **Wickersheim et al. (4,626,110)**

As for **claim 23**, Sahagen discloses an optical apparatus comprising: a measurement tool comprising an elongate body that is coupled to the optical fibre probes (see Figs. 2, 6, 7, 21 with

Art Unit: 2877

two probe configurations: Figs. 24-28). And there is a light source to provide waves for emission through the end of the fiber optic (col. 8, lines 28-30). As for being placed in a well, Sahagen is silent. However, he teaches that the probes are used in harsh environments for monitoring fluid media (col. 3, lines 4-25). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that the measurement tool was suspended in a well in order, for the measurement tool is used to measure fluid media in harsh environments such as a deep well.

As for one probe comprising an optical fiber having a longitudinal axis and a distal end with a tapered tip arranged as a hemisphere, Sahagen is silent. However, he teaches that the system measures temperature (Fig. 3; col. 3, lines 15-20). Wickersheim in an optically measuring technique teaches using a tapered optical fiber probe with a hemispherical tip to measure fluid temperatures (Fig. 3; col. 2, lines 45-55). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have Sahagen's probe system comprise at least one probe comprising an optical fiber with a hemispherical end with a longitudinal axis and tapering in order to measure temperature of fluids in the well being monitored.

13. **Claim 25** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Ramos et al. (5,831,743)**—cited by applicant in view of **Allison et al. (5,812,729)**—previously cited further in view of **Mullins et al. (5,517,024)**.

As for **claim 25**, Ramos discloses the following: a tool having an elongate body suspended in the well (col. 1, lines 1-10; Fig. 2: 25); a light source (Fig. 2: 21); a plurality of optical probes coupled to said elongate body and to said light source and in contact with each

Art Unit: 2877

other (Fig. 2: 26, 25, 21; Fig. 5a: 51-53; Fig. 5b). Ramos is silent concerning the particular numerical apertures; however, he does state that one is a right probe (Fig. 5a: 52) and the others have angles producing light interface at 45 and 73 degrees with 45 and 75 degree outputs (col. 13, lines 25-35; col. 18, lines 30-35). Allison a high numerical aperture light transmitting device discloses that incidence of at least 67 degrees from normal has a NA of .92 and that a normal fiber has a low angle of acceptance with a NA of .2 (Figs. 1 and 6). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that the multiple probe had at least one distal end with a numerical aperture below .3 and one above .8 for a normal right faced optical fiber has a numerical aperture of .2 and an acceptance angle of 73 degrees has a numerical aperture greater than .92.

He is silent concerning a plurality of probes that are not in physical contact with each other. However, Mullins in a logging-while-drilling optical apparatus teaches having a plurality of probes not in physical contact in order to monitor different locations of a borehole (Fig. 1, Fig. 2: 44). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have a plurality of probes not in physical contact with each other in order to monitor different locations in the well.

*Allowable Subject Matter*

14. **Claims 1-10, 22, and 24** are allowed.

As to **claim 1**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an optical apparatus for investigating a fluid stream said distal end of said optical probe comprises a tapered tip having a substantially cubical corner defined by three



Art Unit: 2877

planes substantially perpendicular to each other and not parallel to a plane including said longitudinal axis, in combination with the rest of the limitations of **claims 1-10**.

As to **claim 22**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an optical apparatus for investigating a fluid stream said distal end of said optical probe comprises a tapered tip having a substantially cubical corner defined by three planes substantially perpendicular to each other and not parallel to a plane including said longitudinal axis, in combination with the rest of the limitations of **claim 22**.

As to **claim 24**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in an optical apparatus for investigating a fluid stream flowing in a well said plurality of optical probes includes a first probe comprising an optical fiber having a distal end arranged as either a substantially cubical corner or a substantially uniform cone and a second probe comprising an optical fiber having a distal end arranged as a paraboloid or a hemisphere, in combination with the rest of the limitations of **claim 24**.

### ***Response to Arguments***

15. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

16. The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure: U.S. Patent 3,315,160 to Goodman (specifically, Fig. 2)

U.S. Patent 4,500,204 to Ogura (specifically, Fig. 2e)

U.S. Patent 5,363,458 to Pan et al. (specifically, Fig. 2)

U.S. Patent 5,364,186 to Wang et al. (specifically, Figs. 2a-2g)

U.S. Patent 5,664,036 to Islam (specifically, Fig. 3 and Fig. 10).

17. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

#### ***Fax/Telephone Numbers***

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

- 1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and
- 2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

*Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: (571) 273-8300*

Art Unit: 2877

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431.

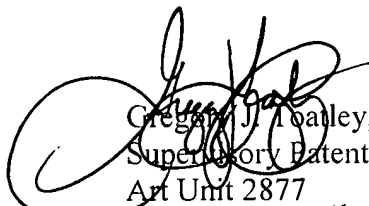
The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached at 571-272-2800 ext 77.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private Pair system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

gs

December 8, 2005

  
Gregory J. Toatley, Jr.  
Supervisory Patent Examiner  
Art Unit 2877  
*12/8/05*